

Application No.: 10/529,376

Docket No.: JCLA16514

REMARKS**Present Status of the Application**

The FINAL Office Action rejected Claims 1-17 under 35 U.S.C. 102(b) as being anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over JP06-212451.

The FINAL Office Action rejected Claims 1-17 under 35 U.S.C. 102(b) as being anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over JP06-198466.

The FINAL Office Action rejected Claims 5 and 9-12 under 35 U.S.C. 103(a) as being unpatentable over either of JP06-212451 and JP06-198466, and further in view of JP02-085350 or in view of US2002/0001779 to Hidaka et al..

The FINAL Office Action rejected Claims 6 and 13 under 35 U.S.C. 103(a) as being unpatentable over either of JP06-212451 and JP06-198466 as applied to claim 1 above, and further in view of US6,031,201 to Amako et al.

The FINAL Office Action rejected Claims 5 and 9-12 under 35 U.S.C. 103(a) as being unpatentable over either of JP06-212451 and JP06-198466 as applied to claim 7 above, and further in view of US2002/0001779 to Hidaka et al or in view of US5,812,629 to Clauser.

The FINAL Office Action asserts the applicant's argument filed December 19, 2008 are not convincing and rejected all the claims of the present invention with some new reasons and other reasons similar to the previous Office Action. **The newly added rejection reasons are summarized as the followings:**

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JP06212451 describes irradiation to produce an interference fringe and describes irradiation with sufficient power to evaporate by the interference fringe. JP06212451 describes producing a diffraction grating, i.e., periodic structure.

JP0618466 describes the laser sufficient to evaporate by an interference fringe. JP0618466 describes laser beams L and La which cross and interfere and produce a diffraction grating, i.e., periodic structure.

Applicants respectfully traverse the rejections addressed to claims 1-7 and claims 9-17 for at least the reasons set forth below.

1. JP06-212451 and JP06-198466 disclose methods different from the present invention

JP06-212451 forms an interference fringe on a metal surface by radiating laser beam. Referring to paragraphs 0015-0017 of JP06-212451, it discloses that the metal surface that has been heat-treated reacts with the reactive gas to form a film as a wave-guide path. When a laser pulse radiates on the wave-guide path, an interference fringe is formed on the metal surface to ablate a micro-uneven on the metal surface.

Referring to paragraphs 007 of JP06-198466, it discloses that the metal surface that has been heat-treated reacts with the reactive gas to form a film as a wave-guide path. When a laser beam L and laser beam La transferred through the wave-guide path, an interference fringe is formed on the metal surface to ablate a micro-uneven on the metal surface.

Both of JP06-212451 and JP06-198466 forming an interference fringe on a metal surface by forming a film on the metal surface by using reactive gas to react with the metal surface. However, in the present invention, a periodic structure is formed with the method comprising

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“irradiating a uniaxial laser beam near an ablation threshold to a surface of a material” instead of using wave-guide path forming by react gas.

In JP06-212415 and JP06-198466, a laser beam is repeated irradiated on a metal surface to form a wave-guide path. The light traveling in the wave-guide path and the incident light are interfered with each other to form a micro pattern perpendicular to the direction of the light traveling in the wave-guide path.

On the contrary, no wave-guide path formed by react gas is required in the present invention. The present invention irradiates leaser energy on the material surface with energy near an ablation threshold. In the present invention, by using process-interdependency in polarization direction, a periodic structure perpendicular to the polarization direction of the leaser beam is formed.

In comparison with the methods requiring to form wave-guide path in the two cited references JP06-212451 and JP06-198466, the present invention seldom occurs energy uneven caused by interference. The present invention can form periodic structure without forming a wave-guide path, which is formed by irradiating one axis laser beam as a non-pre-interfering light. The present invention can change the direction of the periodic structure by merely changing the polarization direction.

In JP06-212451 and JP06-198466, a leaser beam is irradiated in a react gas atmosphere, therefore the react gas should be selected according to the material forming the periodic structure and the material is limited.

Further more, since the pulse with of the ultra-short pulse laser (femtosecond laser) is small, the thermal diffusion is small. Once femtosecond laser irradiates on a material surface, the region temperature nearby the irradiated region will almost not rise at all. Therefore, a femtosecond laser cannot be used in JP06-212451 and JP06-198466, which require the heated metal surface to react with the react gas. That is, the specific effect of the present invention, “when a femtosecond laser is used, the thermal diffusion is reduced to a practically negligible

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level, which is advantageous for processing small parts" cannot be achieved in JP06-212451 and JP06-198466.

The interference fringe forming method of JP06-212451 and JP06-198466 are **totally different** from the feature "irradiating a uniaxial laser beam near an ablation threshold to a surface of a material" of the present invention.

None of the two cited references can make the above feature of the present invention being obvious.

2. Regarding Claim 1 and Claim 7 and other claims

The Final Office Action rejected claims 1-17 under 35 U.S.C. 102(b) as being anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over JP06198466.

However, in accordance with the above analysis on point 1, JP06-198466 forms a fringe on the metal surface in a quiet different way comparing with either Claim 1 or Claim 7 of the present invention. **The above rejection is unreasonable and should be withdrawn. Claims 1 and 7 is novel and non-obvious over JP06-198466.**

The other rejections relating to claim 2-6 and claims 9-17 are made based on the above rejection and should be withdrawn too.

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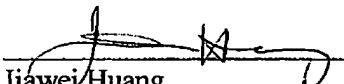
CONCLUSION

For at least the foregoing reasons, it is believed that all the pending claims 1-7 and claims 9-17 of the present application are patentable. If the Examiner believes that a telephone conference would expedite the examination of the above-identified patent application, the Examiner is invited to call the undersigned.

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Respectfully submitted,
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